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# TH/P7-07: Plasma Size and Collisionality Scaling of Ion Temperature Gradient Driven Turbulent transport

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The plasma size (rho*) and collisionality (nu*) scaling of toroidal ion temperature gradient driven turbulent transport is investigated by using a full-f global gyrokinetic code GT5D with fixed gradient (FG) and fixed source (FS) models. The FG model with an adaptive source/sink, which sustains a zero-toroidal-rotation and a constant temperature profile, is newly introduced so as to emulate delta-f like simulations, but still including the formation of mean radial electric fields (Mean-Er) and collisional effects. First, transport dynamics is compared among FG and FS simulations at asymptotically local limit [rho*=(thermal gyroradius)/(minor radius) = 1/300] and a local fluxtube (FT) simulation. It is found that all the cases shows similar characteristics in the avalanche-propagation speed and in the dependency of the propagation direction on the Mean-Er/zonal-Er shear. The probability density function of the radial heat flux for the FS and FG models shows similar tail-components while their frequency spectra show significant differences, i.e., the self-organized- criticality (SOC) type spectrum appearing only in the FS case. Second, three scaling experiments on the heat transport, i.e., minor-radius scan with scaled rho* and nu*(normalized collisionality), rho* scan with fixed nu*, and nu* scan with fixed rho*, are carried out, where rho* = 1/300 - 1/100, nu*= 0.0165 - 0.0495 are examined. An enhancement from Bohm transport scaling, which has been found in the FS case [S. Jolliet and Y. Idomura, Nucl. Fusion 52, 023026(2012)], is found for the present FG case in the first minor-radius-scan even though they show qualitatively different transport dynamics. The second and third scans clarify the critical physical effects behind the enhancement from the Bohm transport scaling. The plasma size (rho*) effects associated with Mean-Er and equilibrium profile shear are responsible for the Bohm transport scaling, while the enhancement of the transport scaling is mainly attributed to collisional (nu*) effects.

## Country or International Organization of Primary Author

Japan

**Primary author:** Mr NAKATA, Motoki (Japan)

**Co-author:** Dr IDOMURA, Yasuhiro (Japan Atomic Energy Agency)

**Presenter:** Mr NAKATA, Motoki (Japan)

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